

9171. A drill string drive comprising:
2 a motor adapted to rotate a drill string;
3 a sensor adapted to detect the rotation of said
4 drill string; and
5 a computer receiving rotational information from
6 said sensor, said computer transmitting control
7 signals to said motor, said computer programmed
8 to control said motor to advance said drill
9 string to a predetermined angle.

1 2. A drill string drive comprising:
2 a motor adapted to rotate a drill string;
3 a sensor adapted to detect the rotation of said
4 drill string; and
5 a computer receiving rotational data from said
6 sensor and transmitting control signals to said
7 motor, said computer programmed to control the
8 rotation of said motor, said computer advancing
9 said drill string a predetermined angle in a
10 first direction and then reversing said
11 rotation and advancing said drill string a
12 predetermined angle in a second direction.

3. A drilling system comprising:

a motor;

a drill string connected to said motor;

a first sensor adapted to detect the rotation of

said motor;

a bit at the distal end of said drill string;

a second sensor adapted to detect the orientation of
said bit;

a computer adapted to receive information from said
first sensor and said second sensor.

4. A drill string drive comprising:

a hydraulic motor adapted to rotate a drill string,
said hydraulic motor having a fluid supply
system;

an operating valve located in said fluid supply
system, said operating valve causing fluid to
rotate said hydraulic motor in a first
direction when open; and

a counterbalance valve located in said fluid supply
system, said counterbalance valve causing said
hydraulic motor to resist external rotational
forces in said first direction when said
operating valve is closed.

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5. A drilling method comprising:
2 monitoring the rotation of a drill string with a
3 sensor;
4 transmitting said rotational information to a
5 computer;
6 controlling a motor that rotates said drill string
7 with said computer; and
8 rotating said drill string to a predetermined angle.

6. A drilling method comprising:
2 monitoring the rotation of a drill string with a
3 sensor;
4 transmitting said rotational information to a
5 computer;
6 controlling a motor that rotates said drill string
7 with said computer; and
8 oscillating said drill string between predetermined
9 angles.

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A directional drilling method comprising:
monitoring the rotation of a drill string with a
first sensor;
monitoring the orientation of a downhole tool with a
second sensor, said downhole tool being
connected to the end of said drill string;
transmitting said drill string rotational
information to a computer;
transmitting said downhole tool orientation
information to said computer;
controlling a motor that rotates said drill string
with said computer; and
rotating said drill string with said computer
controlled motor to a predetermined angle such
that said downhole tool is rotated to a
predetermined orientation.

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